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DISEASES of the NERVOUS SYSTEM

(PUBLISHED MONTHLY)

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

EDITORIAL COMMENT

This number of the Journal will complete the third successful year of publication of *Diseases of the Nervous System*.

Once again the editors wish to express their pleasure over the way the Journal has been received and appreciation for the many favorable comments. We also wish to thank those who have contributed articles during the year.

We feel that the purpose of the Journal is definitely being fulfilled and that now, more than ever before, there is a need to acquaint the physician in general practice with the subjects which are presented. Due to the fact that so many of the neurologists and psychiatrists throughout the country are now serving in the armed forces, as well as the fact that travel will be very limited, the general practitioners who have remained at home are going to be confronted with the necessity of taking care of more and more of the milder neurologic and psychiatric conditions. It is our hope that this Journal may be of help in providing information on these subjects.

Today, War is the subject foremost in the minds of all of us, and we are including in our articles subjects dealing with the relationship between war and neuropsychiatric problems. A great deal of interest is being expressed of late in war neuroses, as well as in brain surgery connected with war injuries. During the coming year we plan to have articles written by some of the men in our field who are now in the armed forces. It should be of great interest to have the impressions of the physicians in service who are having opportunities to see conditions that develop under the stress of war. Of equal importance is the viewpoint of the physician at home who must deal with the problems arising from the effect of war on civilian life. World War One proved the importance of psychiatry and neurology in medicine, and more attention is being given to that phase in the present war, indicating all the more the importance of psychiatry in our world.

As in the past, we shall continue to follow our aim in presenting articles of practical interest to the entire profession, expressed in terms in common usage. We welcome new contributors and urge a continuation of the splendid cooperation which we have received since the Journal was started.

We are gratified with the continued increase in circulation and are looking forward to another successful year.

Titus H. Harris, M.D.
Editor

The Psychic Component in Some Somatic Disorders

ALFRED GORDON, M.D.
Philadelphia, Pennsylvania

Dr. Gordon was graduated from University of Paris, Faculty of Medicine, in 1895. He was formerly Lecturer and Chief of the Neuropsychiatric Clinic and Neuropathology at the Jefferson Medical College. He was also Examiner of the Insane at the Philadelphia General Hospital. Dr. Gordon is at present Neuropsychiatrist at the Philadelphia Psychopathic Hospital; Coatesville Hospital; and Mercy Hospital. He is a member of the American Psychiatric Association, of the American Neurological Association and a Fellow of the American College of Physicians.

In order to understand the relation of psychoneurotic manifestations to clinical medicine in all its ramifications, one must endeavor first of all to form a clear conception of the underlying factors capable of producing functional disturbances in the domain of the nervous system. Not infrequently it happens, as we all know, that when an individual develops for any reason at all subjective disturbances referable to the ear, nasopharynx, or larynx, the otolaryngologist is consulted first. Should the subjective disturbances have an apparent relationship to the function of the ovaries, or to that of the vesical and biliary organs or of other abdominal viscera, to the function of respiratory and cardiac organs, to the function of the eyes, in all such cases the respective medical or surgical worker will be consulted first. Such an attitude on the part of the lay-patient is psychologically logical and correct. But from a medical standpoint, as we know, the above attitude not infrequently leads to serious errors. That is to say, there are disturbances which have no fundamentally serious relationship to any given abdominal or thoracic viscera, but belong to purely mental functions which for reasons of a psychic character dissociated the work of the various elements which enter in formation of harmonious display of organs and tissues. What precisely characterizes the individual in all such cases is not multiplicity of symptoms, not the innumerable functional disorders which may simulate organic diseases, not the painful sensations which he or she experiences, but only a special state of mind, a special mentality.

Human machinery is so complex in its various operations that every one of us, otherwise sound, experiences now and then some indication of a functional disorder. Either there is a gastric manifestation, or a vague pain or a cardiac palpitation or a fugacious neuralgic discomfort. But being normally constituted, we give all such symptoms their proper interpretation. Our attention is not concentrated on them and we continue our activities in spite of their presence. Furthermore, we are able to overcome unpleasant circumstances which may arise at any time. We may even surmount obstacles of a most serious nature. Our relative indifference to all such conditions constitutes a normal state of mental health.

On the other hand, the individual whose attention is held firmly and for a prolonged period of time by those subjective disturbances, who views the least unpleasant event as a catastrophe, who develops ideas and holds on to them for months and years, whose association of ideas is such that fears, anxiety and abnormal inhibitive or abulic phenomena make their appearance with the greatest facility and from insignificant occurrences, whose suggestibility and auto-suggestibility are exaggerated, whose reactions to external or internal stimuli are intense, such an individual presents a type apart. He is an abnormal species of humanity, and therefore requires special consideration.

Some fuller elaboration of this category of individual is now indicated for a clearer understanding of the subject under discussion. First of all, psychoneuroses should be firmly distinguished from mental deficiency. The latter is usually congenital and inherent and is the direct result of morphological or physiological abnormality of the nervous structure. Of course psychoneurotic manifestations may appear in mentally defective individuals, but there is no unusual relationship between the two and we are considering here only intellectually normal cases. Psychoneuroses are fundamentally psychogenic and develop in the midst and because of abnormal psychological experiences. Before discussing these experiences, let us present a few examples of psychoneurotic manifestations:

One female patient, aged 28, following a

normal confinement with no undue loss of blood and with a prompt recovery, misinterpreted her very slight serous vaginal discharges. This, she explained to herself, was due to a serious affection of her genitalia. Otherwise perfectly sound she consulted a number of gynecologists who treated her by various methods, and two of whom performed curetting. The woman became depressed. She was unhappy and in constant fear of malignancy, physical or constitutional, without any actual basis for it. Subsequent events proved that her belief was only psychogenic, as she made a complete recovery under a psychotherapeutic management.

A young married woman, 25, was suffering with chronic constipation. She would occasionally have headache. Coming frequently in contact with a female friend who also had headache, and who attempted to commit suicide in a fit of jealousy of her husband, my patient developed an idea that her friend became insane because of the pain in the head, and therefore her own headache might in the future lead to the same consequences. She was in constant fear of such termination. She was advised to consult an oculist, who promptly refracted her eyes and told her that proper glasses would cure the condition. For two years she was in a state of fear and anxiety without any relief. She consulted a gynecologist and also a general surgeon at different times. The former curetted the uterus; the second operated for suspected adhesions of transverse colon. Neither the glasses, nor the curettage, nor the operation on the colon eliminated the original mental condition, although each one of the three men assured her that their procedure would remove the cause of her morbidity and undoubtedly bring about a complete cure. Under psychotherapeutic measures during a short period of time the fear and anxiety as well as the slight headache have all disappeared.

A young man of 25 for over three years complained of disturbances referable to almost every organ in his body. At first it was the heart, then the gall-bladder, then the nasal cavities, the ears, the eyes, the genitalia, rectum and finally the right hypochondrium. Numerous physicians in and outside of hospitals were consulted and every one advised and actually performed some manipulations of minor operations. Some of them advised extensive abdominal operations. For the last of his multiple complaints a surgeon advised an appendectomy. Accordingly, the patient was placed on the operating table. While the preliminary preparations were being made, namely, the assortment of the instruments, washing the hands of those who were to participate in the operation, etc., the patient was suddenly seized with fright, refused to be operated on and at once left the hospital. Since then there has been no return of pain in the right hypochondrium. Towards the end of his peregrination, he noticed a slight cloudiness of his urine. At once he conceived the idea of a kidney infection. Again he consulted internists, each of whom made a different diagnosis. It was at that time that the writer had an opportunity to see and observe him. It must be mentioned at this juncture that during the entire period the patient continued uninterruptedly his usual occupation, that of a railroad conductor. He slept well and had a voracious appetite.

At the time of his examination there was no doubt in my mind that all his complaints were of psychogenic origin. Psychotherapeutic management alone succeeded in removing the last obsessive ideas. He is well at present, but since such disorders are episodic in character, the probabilities are that new hypochondriasis manifestations will eventually make their appearance when confronted with new emotional factors, the nature of which will be discussed later.

A girl of 17 developed abulic phenomena. If, while crossing a street, she noticed a loose brick on the ground, she was seized with fear and a state of extreme anxiety. She could not and would not step over the object, but walked around it. If she made an effort to overcome her deficient will-power, she trembled, cried, and stopped. Being slender and pale and having irregular and scanty menstruation, she was taken first of all to a gynecologist whose diagnosis was anteversion of the uterus and that the latter was the direct cause of her psychoneurosis. He urged an operation. A general surgeon consulted subsequently spoke of uterine adhesions and advised some surgical procedures, the nature of which I could not determine. A laparotomy was performed, resulting in a decided intensification

of her psychic condition, as well as of her menstrual difficulties.

Examples such as the few related could be multiplied, but these are sufficient to demonstrate that besides physical there is also a psychological approach which, after all, may be the more important, if not the only, method in managing psychoneuroses. An organic or structural lesion can no more be viewed as the sole basis of functional psychic disorders.

In order to know how to manage these peculiar phenomena, let us briefly consider their nature and their meaning.

The behavior of every individual is the result of an interrelation of several elements, namely, emotional instinctive tendencies such as fear, anger, self-assertion, attachment, etc., and also environmental conditions. The instinctive tendencies will have a different coloring in different individuals according to inherited qualifications. A highly sensitive person will manifest his or her emotional elements in different ways than a less sensitive person. The constant inter-action between those instinctive emotions and environmental objects or occurrences produces complex psychological states or complexes. We live, therefore, in the midst of daily or hourly conflict between the inherent and exterior elements. Complexes are being created continually. When they are recognized by the individual-self, the conscious ego is able to overcome them and the normal state is maintained and not disturbed. Many complexes, however, are not recognized, and since all complexes are different from each other and have a different aim and purpose, antagonism of one to another is constantly being created. As they are not recognized, the conscious ego has no control over them, and they may remain with us an indefinite time and are apt to create functional nervous disorders or psychoneuroses. In fixed ideas, obsessions, fears, states of anxiety, abulias, in all such cases, as we have seen from the histories of the few patients cited above, the physical symptoms alone emerge, such as pain in the hypochondrium simulating appendicitis, pain in the cardiac or pulmonary region simulating a disease of the heart or lung, but the emotion associated with the fixed ideas remains, and as long as the latter are unaltered or not removed, the physical manifestation persists and the patient will be unhappy and fearful.

The various physical manifestations of psychoneuroses may be relieved, and the individual may find with an effort on his part a certain skill in adapting himself to his environment and become more or less contented for the time being. But such a situation is not a cure, because the essential element in the conflict of various complexes has not been attacked, namely the emotional instinctive factor, which plays the most important role in the psychoneuroses. Adaptation to oneself is not the sole controlling agency. A psychoneurosis can be removed only when the sufferer is shown how to unravel and lay bare the elements of the complexes which are in constant conflict so as to fit him to face himself. Attempts to remove physical discomfort will not remove the emotional elements which have created the psychic discomfort and which the patient will continue carrying with him indefinitely.

The inability to understand this essential principle, and the want of desire to consider a psychological end in human suffering besides a purely biological end, are the causes of failure of treatment. Therein lies the reason for the fact that very frequently the cause of psychoneurotic disorders is sought elsewhere —in the uterus, ovaries, in the genitalia in general. Next in order is the digestive apparatus that is most frequently incriminated. Dilatation of the stomach, gastroptosis, enteroptosis, nephroptosis, and cholecystitis are all conditions that are thought of and major operations are performed. Not only is there total therapeutic failure as far as the patient's complaints are concerned, but undesirable local and general consequences may arise which will render the operated individual organically unfit in addition to his psychic unhappiness. As one of many examples of this particular contention, I may call attention to the damage produced by castration in women.

In 1924, in a paper read before the American Medical Association, the medical histories of 112 women who underwent complete or partial removal of the uterus or ovaries, or of both, were presented and very extensively discussed from the broadest standpoint by internists, general surgeons, gynecologists and neurologists. It was shown that the preexisting nervous and psychic phenomena, for

which the operations were undertaken, became aggravated in the weeks and the months following the operations. The obsessions and other psychoneuroses with which several women suffered, prior to the oophorectomies, became, since then, more persistent and covered a larger field of morbid ideas than heretofore. Those who suffered with hysterical paroxysms began to have them in a more accentuated form and more frequently. Former hypochondriasis and anxiety states became deeper. All such cases were referred to the gynecologists with indiscriminate assurances that their vague nervous manifestations were exclusively due to indefinite gynecological conditions. Of course the operations were uniformly successful, but the victim's existence was rendered most unfortunate and distressing. It was evident that partial or complete hystero-oophorectomies disturbed the well-established physiologic effect of ovarian tissue on the economy or perhaps disturbed the intimate relationship between various ductless glands which, as we have some reasons to believe, exists. At all events, in addition to the preexisting psychic phenomena additional disturbances were thus created.

The foregoing observations are sufficiently illustrative to contend that the real cause of psychoneurotic phenomena does not lie in accidental occurrences, such as traumatism, fatigue, or local diseases. These factors react on us all daily, hourly, and do not produce disorders of a permanent nature. A psychoneurotic individual on the contrary reacts differently because of his special make-up and mental characteristics. The latter render him highly suggestible, highly sensitive, and highly emotional. While they do not present new phenomena which are not observed in normal individuals, their reaction, however, to all kinds of stimuli is expressed in a greater intensity and is reproduced with a greater facility and branches out in a most unexpected manner. The complexes which were described above and which we consider as the result of conflicts between the instinctive emotional elements and the environmental occurrences are not easily recognized by psychoneurotic personalities because of their peculiar characteristics. The complexes which arise in them are more numerous, more antagonistic to each other because of the greater intensity of each emotional element which enters into the formation of the complexes. The environmental factors which also form a part of the complexes give a different sensorial impression in the psychoneurotics, and consequently the mental representation in them will correspondingly be different from that in normal individuals.

The methods employed in the management of psychoneuroses are several. The object of the present thesis is not the discussion of methods or procedures in bringing to the surface the modus operandi of the complexes which are the basis of psychoneurotic phenomena. My sole purpose is to call attention to the fact that all those abnormal manifestations are too psychic in character, that the functional disorders of which the victims complain, are too much dependent upon special mental attitudes to be attributed exclusively to organic disorders of tissues and organs. Psychoneurotics are psychopathic individuals. They occupy a place between insane and normal. Their number is legion and their multiple manifestations present infinite varieties and subvarieties. The latter are intermingled and mixed with human suffering in all its forms and degrees, medical as well as surgical.

In dealing with human life it behooves us medical men to approach its phenomena not only from a purely biological but also from a psychological standpoint. The former has for object the adaptation of the individual to his environment, the latter is to have him adapted to himself. It is only after the latter task has been successfully accomplished that the individual will be fit to face his environment. No removal of tissues or organs, no artificial correction of disturbances, however accurately or skilfully they may be done, will succeed in making a psychoneurotic discard his fixed ideas, his hypochondriasis, his abulias, his fears or his obsessions, if he or she is not taught properly how to restore peace amidst the bewildering complexes.

Anxiety as a Symptom*

STEPHEN WEISZ, M.D.
Galveston, Texas

Dr. Weisz was graduated from the University of Berlin in 1925. He held appointments in the Neuropsychiatric clinics of the Universities of Greifswald and Kiel. From 1935-1937 he was associated with the Psychopathic Hospital of the State University of Iowa; 1937-42, in charge of research at the Galveston State Psychopathic Hospital. At present he is Instructor of Neuropsychiatry and Pathology at the Medical Branch, University of Texas. He is a member of the American Psychiatric Association and is certified for Neurology and Psychiatry by the American Board of Psychiatry and Neurology.

Perhaps no other phenomenon has had so many interpretations as anxiety. It is such a singular manifestation that it appealed to both philosophers and psychiatrists who tried to analyze it and discover the purpose it serves.

Mystics like Pascal and Kirkegaard[6,11] saw in it a sign of our human wretchedness and a heritage of the original sin, respectively, the latter believing that rescue lies in true religion. Activity which helps man escape anxiety is actually just like narcotizing ourselves. Calm and serenity can only be found in religion. Modern philosophers regard anxiety as a counterpart of our existence, as a dread of annihilation, as a loss of our existence on a personal level.

The medical interpreters are not less varied in their views as to the origin, source, and mechanism of anxiety, although all agree that it represents a psychosomatic response and a reaction to danger. The character of the danger situation has received much attention since it was felt that it must be a particular type of danger to which anxiety is a response. Ross proposed a rather suggestive explanation. He looks upon anxiety as an emotional over-reaction of positive character in which, to follow Strecker and Ebaugh, the reflexes of preparedness once established remain and tend to keep going even after the original situation itself disappeared. It is accompanied by hyper-activity of the autonomic nervous system, often in a distorted form. It is a sort of "still" fighting reaction, an ineffectual struggle against difficulties to be sure, but a struggle none the less with fluctuations in the intensity of its symptoms. Pavlov's experiments on the conditioned reflex served as a model to Ross' views.

Freud devoted almost 15 years to studying and analyzing anxiety from his own particular premises. He expostulated two views in succession. The first one was a physiological explanation. Repressed impulses mainly of sexual origin, that is, impulses if prevented from orderly discharge were thought to be transformed and converted into anxiety. This explanation was later abandoned in favor of a second psychological interpretation. Anxiety now becomes the cause of repression rather than the result of it and arises from fear of those impulses the execution of which would lead to external danger (Horney). According to this interpretation all anxiety can be traced back in the last resort to an external danger, the prototype of which is the situation at birth. According to Freud, birth is a traumatic situation because it means a sudden change of environment, a reorientation in the function of many somatic processes and a loss of the intrauterine security. (Healy, Bronner and Bowers). In other words, the first "anxiety" occurs during birth. It becomes the model for all subsequent anxieties, and it is reproduced as a signal whenever a situation like that of the birth threatens. To make it clear, the situation at birth is to Freud a traumatic situation of helplessness.

Certain objections were raised against the idea that anxiety was a reminiscence of the birth situation since the new-born baby cannot be aware of danger during the process of birth. Freud believes that the increase of tension which the new-born baby must have experienced is the important factor rather than any knowledge of danger. Anxiety is reproduced automatically whenever the inner tension approaches that of the birth situation. With development of the organism, however, the function of anxiety changes. The organism will use this same mechanism purposefully as a warning and safely signal whenever the organism anticipates a traumatic situation, that is, anxiety has now become a signal of danger which in turn gives

*From the State Psychopathic Hospital, Galveston, Texas. Read at the meeting of the Texas Neuropsychiatric Association, Nov. 17, 1941.

the organism a chance to inaugurate repression and thus a chance to avoid actual danger to the organism by the formation of symptoms. Only if symptom formation is prevented will the organism proceed to manifest anxiety. The utilization of anxiety as a signal represents an improved self-protection of the organism since it now comes into play whenever danger is anticipated rather than in the actual danger itself.

According to Freud, anxiety cannot be looked upon as the best form of signal. A cool appraisal of the situation would be much better. Anxiety was an appropriate reaction at birth but it is inappropriate and inexpedient in later life. It represents, however, the best makeshift arrangement at the disposal of the organism. Freud thus avoided a difficult impasse which had to be faced by those investigators to whom anxiety meant awareness of danger. Because awareness of danger implies experience the question had to be answered as to how the small child knows when he first feels anxiety, that he is in a situation of danger. Some investigators fell back upon some hereditary pattern to overcome this difficulty.

Karen Horney deviates from orthodox psychoanalysis in many respects. To her, repressed hostility is the main source of anxiety. Hostile impulses become repressed if they would lead to catastrophe and thus would endanger the organism unless repressed.

Three distinct sets of observations may help us to clarify the problem. Goldstein made extensive observations on patients with brain injury. He found that if his patients had to face a task they could not cope with adequately, anxiety made its appearance with all its physiological manifestations and subjective dreadful feelings. They showed changes in the color of face, changes in pulse, restlessness, tremulousness, antagonism, and anger as a result of their helpless state. He noticed that spontaneous restriction of activity in these persons with brain injury, that is, orderliness and the avoidance of stress, prevented anxiety.

Other important studies were made on animals where behavior disturbances were produced by means of the conditioned reflex method. This behavior disturbance, also called experimental neurosis, furnished interesting data. The experiments were carried out on dogs, sheep and the pig. Gant found in dogs negativism, refusal of food, whining, barking, agitation, increased respiration, forced breathing, frequent uncontrolled micturition and premature ejaculation. Liddell and a number of other workers under his supervision subjected the sheep to the same experiments over a number of years. The following symptoms were observed; hyperirritability, a tendency to react before the animal had cause for reaction, restlessness, tension, tossing of head, agitation, change in respiration, irregular pulse, increased pulse rate, withholding of feces and micturition with sudden voiding, antisocial behavior, aggressiveness, and so on. It was found that adrenalin aggravated the symptoms and that thyroid extracts had no effect. Sodium amytal on the other hand decreased these symptoms. If the sheep was subjected to the experiments by means of difficult differentiation and other methods it bravely withstood the experiments until it became unable to cope with the task and developed a helpless state. A breakdown occurred and the sheep's behavior changed. The sheep became restless on the platform, kept its leg moving, resisted going back to the laboratory and also showed in the barn away from the test situation more or less those symptoms enumerated before. Of seven animals tested and observed over a number of years by Anderson and Parmenter only one showed a spontaneous remission. Two of the sheep showed inhibitory patterns instead of the above described excitatory pattern. Abnormal manifestations once present tended to continue. Frequent rests were beneficial and postponed the breakdown. Forced testing precipitated the breakdown. It was noticed that when using electric shock to the foreleg as a stimulus the first sign of developing breakdown was a sensitiveness of the leg to touch. Dog and sheep showed somewhat different patterns, obviously due to the difference in their neural organization, but they all showed characteristic behavior disturbances. The pig stood tremendous amounts of frustration before becoming neurotic and in only one out of five animals did the testing lead to neurosis. (G. F. Sutherland.)

Before turning to the third group of observations let us summarize the essence of these two groups of data gathered on such different

material. The breakdown of Goldstein's patients occurred under acute stress. He produced a state of helplessness in his patients, who were reduced in their efficiency by an organic lesion. Their reaction was a direct response to a traumatic situation. The experiments with the animals represent a somewhat different situation. The animals were first trained for a testing situation and cooperated and tried to cooperate to that end but they encountered tasks beyond their capacity. The dissociation of their normal behavior pattern took place under circumstances of actual conflict. The animal intended to solve the task but could not, wanted to escape but was trained to stay; moreover being in harness, it was forced to stay. It was not a situation as it would appear to an untrained animal but of one which relinquished its neuromuscular freedom. This is the important difference between the two observations. The reaction of the patients was a response to a direct traumatic situation whereas with the experimental animals a situation of conflict was present. This may explain the prolonged reaction of the animals.

The third group of observations comes from the study of the emotional behavior of infants. During the first two weeks of life the emotional reactions of the baby show two patterns, either comfort or discomfort. When the baby was in stress it struggled, cried, and was restless. It showed, in other words, an upheaval which Murphy calls a general emotion. Distinct patterns adapted to the particular situation appeared only with later development based on maturation and learning. But even after definite patterns were established they again became obscured under great stress and the organized emotional expression again faded. The last group of observations appear to be of value because they point to a differentiation of emotional responses with development. The first emotional responses in life are a mass response without the organized pattern we see in later life. It is primitive, course, and diffuse.

The three groups of observations together, as different as they may seem, help to qualify the danger situation to which anxiety is a response. Anxiety is a response to a danger situation but a reaction in which as far as the somatic repercussions are concerned the integrated preparedness of the organism suffers. De-differentiation takes places returning to the indistinct pattern of early life, which explains why intense anxiety may paralyze rather than instigate action. Cannon calls the emotional situation an emergency characterized by purposeful, integrated, unified somatic processes. Anxiety stands apart with its more or less dissociated somatic manifestations.

The question may now be raised as to why anxiety develops in certain situations instead of fear, since, according to all accepted views, fear also represents a reaction to danger. Fear represents, however, an organized response with the definite implication of flight. It is directed toward an object in the real world which is clear and shows a preparedness on the part of the organism to cope with it. It is a proportionate reaction which ceases as soon as the danger is eliminated. Anxiety, on the other hand, is a reaction out of proportion to the actual danger involved. It anticipates helplessness and disaster to the organism, there is no escape and, therefore, it tends to persist. The danger situation provoking fear is manifest, while that of anxiety is subjective. It is a threat the basis of which is purely individual. It is not the situation as it stands but the situation as it appears to the individual which is the fundamental characteristic of anxiety. (Horney).

It is a matter of definition whether the response to a direct traumatic situation which precipitates a helpless state of the organism is to be considered anxiety in the stricter sense of the term. Freud and Goldstein both consider it so, although Freud qualifies it by calling it automatic anxiety. This question is beyond our interest. To us the conflict situation of the trained animals appears to be the experimental paradigm. It was a conflict situation which produced the traumatic situation or the animal's helpless state. The mechanism of anxiety in children probably is very similar.

We must now ask where the threat to the individual comes from. Why does the individual feel that he has no adequate strength to deal with the particular situation? The cause for it is obviously in the organism with meaning only to that particular organism. The factors generating the threat are hidden, beneath the level of awareness, essentially not known, dimly sensed, or entirely unconscious.

The threat arises, therefore, from internal causes. Freud called this type of anxiety—neurotic. To us it is anxiety as we understand the term.

What are the sources of anxiety? What creates the feeling of impending danger and anticipated helplessness? One source represents a response to situational difficulties, that is, to straining experiences when the person is faced with tasks he is unable to cope with in chronic conflict situations. We see this in those cases of anxiety neurosis which came about in response to a prolonged situational stress. The conflict situation of the experimental animals was rather obvious. But in principle they are comparable to human conflict situations. French, a psychoanalyst, in his discussion of Liddell's report, elaborated on this resemblance. The other source of anxiety is purely internal. Here anxiety is a signal for defense against potentially dangerous wishes and craving. It occurs when the security of the person is threatened by the pressure of forbidden or repressed impulses, when a satisfactory adjustment between inner cravings and outer restrictions is impossible. (Noyes). To use the words of White, anxiety of this source develops when an internal condition arises which may be destructive to the organism. Again, it is of no particular interest to us whether those internal factors are the result of repression or not. What is important is the fact that it is a psychological danger the person cannot escape by flight or fight and that it threatens the individual for inner reasons and inner reasons alone. Often the two sources of anxiety combine in an actual case. Anxiety of somatic origin is, of course, outside of the sphere of psychopathology.

Goldstein, White and Menninger mention what one might call the creative aspect of anxiety. Due to our ability to anticipate dangers, to see ahead and avoid them, anxiety, in a sense, is one of the spurs to progress, one of the incentives to establish security, to move in the direction of sublimation, one of the stimuli for creativeness.

Anxiety has a wide distribution and it is one of the most commonly observed symptoms in clinical psychiatry. Often it is of low intensity or it may be almost continuous. The patient may be worried and afraid of practically everything. He may be inclined to be tense, uneasy, and apprehensive and anticipate trouble on every score. It may be as mild as it is seen in an over-protective mother to whom every sneeze of the child presages a serious illness. Anxiety neurosis, also called anxiety state has several forms. We see anxiety attacks, that is, manifest anxiety, conscious and diffuse, free floating as Freud expressed it. It may reach the proportions of a panic. It may have no content at all or it may attach itself to any chance content which may be expressed such as fear of dying, fear of going insane, fear of cancer and so on. At the same time it shows violent physical symptoms well remembered by everyone who ever saw a patient in an anxiety attack. It is one of the most tormenting situations one can have. The patient fears the recurrence of such an experience. It is unbearable in its painfulness. It may be so intense that the patient may do everything to break it. Suicidal attempts are, therefore, not uncommon. It obviously comes closest to a feeling of catastrophe which a person can have. A much more common form of anxiety state is the one Freud called anxiety equivalent or as we call it in the clinic a tension stage. Here the anxiety may be represented by a single intense symptom referred to the heart, to the colon, or it may appear as a choking sensation, or it may present a set of symptoms such as sweating, palpitation, diarrhea, choking, nausea, frequency to urinate, headache, etc. On the mental side there may be some restlessness and an uneasy feeling, but fears and dread are almost completely absent or hardly noticeable. Such persons may be convinced of having a physical disease.

Psychopathologicaly speaking this condition is interesting because, although there is no doubt that it is a type of anxiety neurosis, yet conscious anxiety is almost completely excluded from consciousness. Anxiety being a psychosomatic response here we deal with a condition in which the mental side of the psychosomatic response is pushed into the background and thus the psychosomatic response appears dissociated. Freud maintained that conscious anxiety does not come about if its energy becomes bound into a symptom. In these equivalent states the reverse is present. The conscious feeling is excluded and the biological somatic manifestations alone appear. In still another form, anxiety may

undergo a peculiar transformation and may become attached to a definite outside situation. We then deal with a phobia. Anxiety is projected here and transformed into a specific fear, into a fear of definite object or situation which can now be avoided and from which flight is thus possible. All the person has to do in order to avoid this anxiety is to avoid the particular external situation. We see here that the organism has dealt with anxiety in a uinque way. By the imposition of an inhibition, that is, the phobic symptom as, for instance, not to cross the street, or to avoid crowded places, the person is able to escape conscious anxiety. This mechanism of projection of the anxiety is common in children. How unstable the phobic arrangement is can be seen by the fact that a person who is afraid, for instance, to cross the street, may lose that fear completely if accompanied by someone else. His anxiety reappears, however, if he is forced to act contrary to his inhibition. There is some discrepancy of opinion as to whether to classify phobia as a separate group or with anxiety neurosis or psychasthenia. A question of no import in this discussion.

Anxiety is common also in compulsions. As we know in compulsive states there is a continuous struggle to maintain repression. It is, therefore, understandable that anxiety reappears as soon as, for instance, a person with compulsion to wash his hands is prevented from doing so.

Phobia and compulsions are good examples to point out the almost reciprocal relationship between anxiety and symptom formation. Symptoms take the place of anxiety and interference with the symptoms reactivates anxiety. Anxiety as a symptom is conspicuously absent in hysteria. It appears that in this neurosis the defense arrangement is more stable and successful.

That anxiety is a frequent symptom of psychoses is generally accepted. It appears in early organic reactions but may also be part of a depression, invclutional melancholia, or early schizophrenia. Let us disregard anxiety in organic conditions at present (we mentioned it in connection with Goldstein's observations) and say a few words only in regard to its appearance in functional psychoses.

Depression with tension and anxiety is well known. If a depressed patient feels abandoned, rejected, and helpless in spite of intense desire to expiate and obtain forgiveness there is likelihood of an anxious admixture to the picture. (Manslow and Mittelmann.) Anxiety in involutional melancholia is frequent. Whether it is due to an unconscious egoism of the patient which leads to preoccupation with death because its egoism finds no satisfaction in this life and yet because of his egoism the patient is abhorring the idea of death, as McCurdy suggests, and anxiety appears in connection with this inner struggle, or whether it is the result of a feeling of retribution by the outside world for aggressiveness in life we can only conjecture. Much will depend upon the standpoint of the psychiatrist what his interpretation will be. In early schizophrenia anxiety may also be present. The world may be experienced as full of danger and pain by some schizophrenics yet if the renunciation of the outside world and withdrawal from it is experienced as forced anxiety may occur.

Thus it appears that anxiety as a symptom may be present in many conditions whenever some psychological danger is present, whenever the individual feels threatened for reasons not known to him and he lacks defense and cannot escape.

Beginning with those cases in which anxiety neurosis appears as a culmination of a period of tension and where, as Billings puts it, it is more an alarm signal type of reaction up to those cases in which anxiety is distinctly the result of a long inner struggle—it represents a symptom which indicates human distress.

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Endocrine Therapy in Neuropsychiatric Disorders*

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Because of the ever-broadening horizons of medicine the practicing physician must be constantly ready to reorient his concepts of pathogenesis and therapeutic rationale. Contributions requiring such readjustments have been forthcoming from many extrabiological spheres as evidenced, for example, by the recent use of the electroencephalogram in diagnosis and analysis of brain functions, and the introduction of electrical shock therapy in serious psychotic disorders.

The biological fields, however, still remain the greatest contributors to medical advancement. This is not surprising since *man*, the ultimate beneficiary of all scientific advancement, in spite of all his recently acquired mechanistic clap-trap, continues on as a biological entity.

Among the many contributory sources which in recent times have advanced the understanding and the treatment of disease processes, *endocrinology* has taken a prominent position. And if ever a single link, complex though it may be, were required to actually explain the unification of the many physical and mental functions of the individual into that smoothly flowing psychobiological phenomenon called *behavior*, the humoral processes would certainly be accorded first position.

This assertion should occasion no undue surprise. The "homeostasis" of Cannon[1] is nothing other than the maintenance of a properly balanced and physiologically acceptable milieu which lends a normal framework to the otherwise internal functionings of the organism. The influence of the endocrines—notably the pituitary, thyroid, parathyroid and adrenal glands—in the maintenance of normal electrolyte balance is now well known.[2,5]

The size of the brain is normally highly correlated with body size[6,9] and although in postnatal states the brain size of mammals remains uninfluenced by the growth hormone[10,12] brains of tadpoles[13] or unborn rats[14] subjected to this hormone, do disclose evidence of added neuronal proliferation.

Although this resulting alteration of the nervous system by a hormone is in itself no direct proof of behavioral influence, the interrelations disclosed by anatomical,[15] biochemical,[16] psychological,[17] physiological,[18] neuropathological[19] and clinical studies[20,22] lead unmistakably to such a conclusion. As a matter of fact not only does the endocrine system affect neural functioning but an intact nervous system is an important requisite for optimal endocrine activity.

Thus, lesions of the tuber cinereum may result in pituitary obesity[20,22] and the wandering of fat to the liver after phlorhidzin pois-

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oning is prevented by the sectioning of the cervical spinal cord.[16] Excitements and anxiety frequently lead to glycosuria and the awareness of his glycosuria by a diabetic patient may certaintly result in anxiety. Defective thyroid function resulting in cretinism or myxedema is commonly associated with a slowing of the thought processes while hyperthyroidism may lead to overactivity, irritability, tremors and agitation.

Such psychosomatic interaction results, of course, from the interweaving of somatic and autonomic nervous system functions. The glands of internal secretion influence body and brain and these in turn affect the glands. The true complexity of the process becomes even more striking when one recalls that neural transmission when once initiated may, through the formation of the neurohormones —acetylcholine and sympathin or adrenalin[23,26]—activate other more remotely situated nervous tissues; and that the endocrine glands—many of which secrete a number of hormones—not only influence extraglandular functions but frequently affect each other. If one now adds the fact that two hormones secreted by the same gland may actually antagonize each other, one begins to appreciate the amazingly complex and unique labyrinthine linkage which unifies the soma and the psyche.

In spite of their intimate association with the nervous system the endocrine glands can under certain conditions continue to maintain their functional autonomy. This is demonstrated by their ability to maintain physiological balance even when their own nerve supply is cut.[27]

It is this interplay of their *local*, their *somatic* and their far-reaching personality effects which makes the incorporation of endocrine advances into neuropsychiatry so essential.

Practically all the endocrine glands have by this time been implicated as affectors of behavior.[28] These include the *pituitary*, the *thyroid*, *parathyroid* and *suprarenal* glands, the *ovaries*, *testes*, and *pancreas*. Other glands whose endocrine functions are more or less accepted but whose activities are less accurately known are the *pineal*, *thymus* glands and the *liver*.

That the pituitary gland bears a distinct relation to behavior is indicated by the study of Rowe.[29] He reported that of 374 problem children presenting varying degrees of bullying, disobedience, vagrancy and moroseness, 279 or approximately 75 per cent showed distinct evidence of pituitary defect. Of course, this may indicate that genetic factors responsible for the tendency towards misbehavior are likewise responsible for the pituitary disorder. And these genetic elements may be different for the psychic and somatic aberrations. But their frequent association is certainly striking.

Although some authors report specific personality traits to be associated with specific pituitary dysfunctions—as for example the "aggressive-dominant personality" of the Lorraine-Levy hypopituitary child and the "submissive-compliant" personality of the hypopituitary patient with the Frohlich configuration[30]—on the basis of personal observation it appears that such personality relationship is not really fixed. It is true that numerous endocrinopathic children disclose defective personality pictures but these are generally non-specific in that they seem to be largely dependent on the life's experience of the individual.

S. K., a white male, 12 years, nine months of age, presented a typical dystrophia-adiposo genital syndrome with characteristic shoulder-pelvic-girdle adiposity and infantile genitalia. He was mentally alert, very boastful, and realized his intellectual superiority over other children. But he was also painfully aware of his genital abnormality. He refused to undress in the gymnasium or to enter in the nude the swimming pool at school. On The Binet-Simon test he displayed a mental age of 18 years 3 months and an I. Q. of 143. Here we were dealing with a mentally precocious child with dysplastic constitution whose judgment, still in keeping with his chronological age, permitted him to flaunt his mental superiority before his classmates.

As a result he became the shunned member of his class. Left to himself he became more egocentric and self-sufficient. He was treated with anterior pituitary extract (Squibb) (2 cc. twice weekly) and placed on dietary restriction. Although he lost weight on this regime his genitals failed to develop. He was therefore given subcutaneous injections of testosterone propionate (Perandren) 25 mg. twice weekly for 1 month, then 10 mg.

biweekly for 1 month, then 5 mg. biweekly. Psychotherapy, by way of persuasion and reeducation in order to improve his personality traits and social relations, was also included. Only after nine months of such treatment when his bodily form approached normal and his sex organs showed marked development did he make a satisfactory adjustment toward his work and playfellows. He then saw and accepted his previous forwardness and conceit in school as an overcompensation—a result of feeling different and inferior to the other children.

M. S., another white male, 14 years of age, also presented a syndrome of dystrophia-adiposo genitalis. In addition, he displayed bilaterally undescended testes. But unlike the previous patient, he was slow in action, shy and retiring, refraining particularly to play any games with other boys requiring a display of physical prowess. He was treated with prolan receiving doses varying from 50-200 R. U. three times weekly, dietary restriction, small doses of thyroid and psychotherapy in the form of mere provocative suggestion concerning his developing personality. His bodily configuration changed toward normal, both testes descended, he became mentally more alert and gradually lost his shyness. He spontaneously began entering into football games with his classmates and for the following Christmas—six months after treatment began—requested a set of boxing gloves.

Both of these patients have now been followed for some eight years. The first is a successful student of engineering. The other is employed as a clerk in a local department store at the same time taking a business course in night school.

Here we have examples of aggressive and regressive personality types; both in patients with hypopituitarism of the Frohlich type. Both made good adjustments.

How much of their personality difficulties were directly due to hypopituitarism and how much was due to the numerous and subtle painful experiences through which they lived is merely a matter of conjecture.

Suffice it to say that some dysplastic individuals with personality difficulties fail to alter their pretreatment behavioral tendencies even though their physical defects are improved. As a matter of fact, some such patients in spite of continued psychotherapy give up one set of antisocial characteristics only to take on another.

One such patient, D. W., a young college student 19 years of age was seen at the request of one of his professors because he appeared to "day-dream" in class and made poor marks. Examination disclosed a beardless boy well grown physically except for an infantile penis. Mentally, he seemed quite alert, made a score of 120 on the Bellevieu intelligence test but harbored deep resentment against some of his classmates who, having dubbed him "Little Joe" as a mark of distinction in earlier school days, continued the identification in college.

Treatment with pituitary preparations failed to influence his genital defect. He was therefore given injections of 25 mg. of testosterone propionate (Perandren) twice weekly. At the end of six months his penis had grown to normal size. He then began "hooking" school and fell so far behind in his studies that he was dropped from the class. He acquired a position in a store and for no ascertainable reason, he began selling the merchandise for less than cost. He was dismissed by his employer and in one way or another continued to display such seemingly senseless behavior.

Some behavioral difficulties associated with endocrinopathies are distinctly secondary. These generally occur in patients who before they became aware of their disability were completely normally-behaved.

For example, G. M., a young girl just over 16 years of age, applied for treatment "because of shortness" and tearfully bemoaned the fate which had cause her to remain "unnoticed" while her girl friends were beginning to go to parties. She had failed to grow since she was 12 years old. She was only 53.5 inches tall compared to the minimum normal of 61.1 inches, but showed no epiphyseal abnormality. She was often sad, and lost her appetite and frequently cried. Her brooding led to difficulties in sleeping and she began more and more to remain indoors.

She was treated with injections of anterior pituitary extract (Squibb) which had been standardized for its growth potency. In addition psychotherapy was employed in an attempt to build up an attitude of acceptance. It may here be noted that the realization of being different from the herd is painful and

where conditions cannot be altered the inculcation of stoicism becomes in itself a major therapeutic aim. At the end of five months she had grown only one inch but her attitude was so improved and the growth stimulating process so slow that further treatment was discontinued.

Two other patients 17 years of age were candidates for admission to the U. S. Naval Academy. Each had failed to qualify only because he lacked 3/4 inches of the minimum requirement of 65.5 inches. These boys, too, felt that their careers in life had ended even before they had begun and both experienced those pangs which can only arise from such staggering disappointments.

Treatment with anterior pituitary extract (Squibb) and small doses of thyroid over a period of three months resulted in each case in sufficient growth to enable these boys to gain admission to the Naval Academy. One has since been graduated, the other is still a midshipman.

Whether it is causal or merely associative the fact remains that many psychotic patients show metabolic disturbances which are plainly indicative of pituitary involvement. This is particularly evident from the frequent association of menstrual disorders in schizophrenics and the existence of hyperprolanuria in such patients.[31]

After demonstrating the disturbed specific dynamic action in early cases of schizophrenia, Fischer[32] treated a group of such patients with hormone therapy. It was observed that injections of *praehormone*—a pregnancy urine extract—led to remission in 43 of 50 patients who had been ill for less than 6 months. In 43 patients whose illness extended for more than 6 months only 17 showed complete remission but 14 others were improved. Interestingly enough, however, Fischer's use of *praephysin,* an extract of the anterior lobe of the pituitary, the gland most responsible for specific dynamic action, failed to result in any striking cures. Obviously, the problem requires further investigation.

Perhaps of all the glands affecting behavior the thyroid is most important. This is not only due to its intricate functional relationship with other endocrine glands but perhaps more so because the maintenance of the rich brain iodine content is so closely dependent upon adequate thyroid function.[16] Disturbances of this gland, therefore, frequently result in serious behavioral defects. Recognition of the underlying cause and the institution of proper treatment, if not too late, may do much to relieve such patients. Early treatment in such cases is particularly stressed since long standing thyroid insufficiencies may so alter the histological picture of the neurone as to leave it forever irreversible.

J. G., a white male 6 years of age, disclosed marked growth defect and mental retardation when first seen 7 years ago. Although his endocrinopathic condition had been previously recognized, he had never been treated. His height of 39 inches was 6.5 inches below the minimum normal for his age and psychometric study disclosed a mental age of 3 years 5 months with an I. Q. of 45. Continuous therapy with thyroid extract and the growth hormone resulted after 3½ years, when he was 10½ years old, in a stature of 51.3 inches which was now only 2 inches below the minimum normal. His mental age, however, was now only 4 years 6 months and his I. Q. practically equalled his previous low figures of 45 (actually 43). By now he has grown to the minimum normal for his age (13 years) but his mentality has remained uninfluenced.

M. S., a boy of 12 years when first seen in 1933, had a history of essentially good school progress until the year preceding his visit. His basal metabolic rate was minus fifteen and his I. Q. was 80 (dull normal). Adequate thyroid therapy resulted within 6 months in a rise in basal metabolic rate and an I. Q. of 95, a normal level. He was then kept on thyroid therapy and observations for the following 7 years when at 19 years of age he was graduated from high school. For the past year he has taken no thyroid and manages to work quite satisfactorily as a clerk.

R. K., another boy of 9 years 4 months, was first seen in August, 1940. The complaint of his mother was "slowness in school" of relatively recent origin. Because of his lack of cooperation basal metabolism could not be determined, x-ray of his epiphyses disclosed no developmental retardation which would be present in long standing hypothyroidism. Psychometry disclosed a mental age of 8 years 7 months, an I. Q. of 92 but a base line of 7 years. Although an I. Q. of 92 is classified by psychologists as "low average," because of his low base line of 7 years it was felt that

this child would more properly fall into the class of "dull normal." Because of his general slowness of speech and action and because of the relatively recent onset of the disturbance the boy was considered as probably being affected by mild hypothyroidism. Adequate thyroid therapy was therefore instituted and in February, 1941, 6 months later, the child, who was now 9 years 10 months of age, showed a mental age of 10 years 11 months, an I. Q. of 111, and a base line of 9 years. His interest in school work increased and his marks again became good. His entire attitude changed. His indifference towards school attendance gave way to eagerness. He again felt himself as one of the class.

Patients with thyroid deficiency (myxedema) may become apprehensive, slow thinking, slow moving and emotionally depressed. Thus they may resemble patients in the depressed phase of manic-depressive psychosis. On the other hand, they may become hyperirritable and excited and actually mimic a maniacal outburst.[33] Occasionally, a patient exhibiting the typical emotional flattening of the schizophrenic may be found to have an associated cholesterolemia. Since high blood cholesterol frequently accompanies hypothyroid function, Duncan[34] studied the effect of thyroid medication in such a case. The patient showed "profound emotional deteriorization" and a serum cholesterol of 502 mg. per cent. Thyroid therapy resulted in a lowering of the blood cholesterol and marked clinical improvement. When therapy was discontinued the cholesterol again rose to 414 mg. per cent and the "emotional dullness" returned. When tried on other cholesterolemic patients suffering from frank schizophrenia or congenital mental defects thyroid medication failed to improve the mental condition in spite of the fact that it did lower the blood cholesterol.

Closely associated with the thyroid gland is the parathyroid. Their anatomical contiguity always makes the removal of the one a potential threat to the integrity of the other. Thus, while parathyroid insufficiency may occur spontaneously, it generally follows a thyroidectomy. Calcium balance is then disturbed and blood calcium becomes diminished. Muscle spasms, tremors, cramps, irritability, restlessness and depression frequently alternating with maniacal excitement and rage may ensue. Parathyroid extract (Parathormone), calcium, lactose and vitamin D are frequently useful in managing such an acutely disturbed patient. Chronic hypoparathyroid states, however, are best controlled with dihydrotachysterol and calcium. Two to 5 cc. of dihydrotachysterol usually suffices for the first few days. Thereafter, depending upon the concentration of blood—and urinary calcium the dosage may be decreased to 0.5 cc. or less daily with or without calcium by mouth.[35] It is interesting to note in this regard the close chemical relationship of some of the vitamins to the hormones.[36]

Occasionally, the parathyroid glands, as a result of tumor formation, oversecrete. Calcium is then mobilized from the bones and floods the blood stream. If the process goes on for any length of time the bones become soft. Spontaneous fractures, bony distortions and kidney stones may then arise to disturb the mental equilibrium of the victim. But long before these changes occur the patient may begin to feel listless, his muscles may act sluggishly and he may be overcome by inexplicable mental torpor and depression. Of course, in such cases only surgical removal of the parathyroid tumor can alleviate the condition.

The adrenal gland which has recently been subjected to vigorous investigation has also yielded many secrets which are of immediate value in counteracting behavioral disturbances. Its medullary hormone, *adrenalin*, is now known to be identical with the neurohormone *sympathin* and the part it normally plays in reactions to environmental changes is well established. When overproduced, its generalized effects, which undoubtedly result through its sympathicomimetic action may lead to neurotic symptoms[37] including feelings of anxiety and panic. The hypochondriacal complaints of some patients may be due to its local visceral or even somatic effects.[38] Such symptoms occasionally characterize the presence of medullary pheochromocytoma (paraganglioma or chromaffinoma) which is classically described as leading to paroxysmal hypertension.[39,40] In such cases, it is obvious that only surgical removal of the tumor can affect a cure.

The rapid action of adrenalin limits its clinical use as a drug in the more protracted disturbances usually encountered in neuro-

psychiatry. The sympathicomimetic drug amphetamine sulphate (*benzedrine*), however, while not an endocrine preparation, is chemically closely related to adrenalin and is functionally quite similar to it. When benzedrine is used in proper dosage it acts like adrenalin in slow motion. It affects peripheral vasomotor and pressor functions, it stimulates the central nervous system and can simultaneously alter mental and emotional processes.[41,43] Although seriously disturbed psychotics may fail to respond to this form of therapy mildly depressed patients may become more alert and may experience a greater feeling of well-being. In a series of 32 mildly depressed patients personally observed, 24 showed a distinct affective lift within 10 days' time. When its use fails to produce an early emotional improvement the drug should be discontinued since overactivity, sensations of cardiac distress, sleeplessness and marked feelings of fear may result.

The adrenal cortex is the more important part of the adrenal gland. Because of the elaboration of adrenalin by numerous and variously distributed structures in the body, life can proceed quite well if the adrenal medulla is bilaterally destroyed. But if the adrenal cortex is bilaterally extirpated the animal dies. Such adrenal cortical deficiency occurs in nature as Addison's disease and is marked by striking disruption of water and electrolyte balance. While this in itself may, because of its seriousness, prove fatal perhaps from the neuropsychiatric viewpoint the most important manifestations of cortical hypoadrenalism depends upon the resulting disturbances in sugar metabolism.[45,46]

The brain, as is well known, depends almost exclusively upon carbohydrate as its chief metabolic substrate.[85,86] In adrenal cortical deficiency the absorption of glucose from the G. I. tract becomes difficult, the available carbohydrate stores including the liver glycogen become depleted and the ability to convert protein metabolites into carbohydrate suffers. Hyperglycemia therefore results. As a consequence, the brain is practically starved. If the condition persists, it may lead to marked personality changes, habit deterioration, and numerous hypo and hyperkinetic nervous phenomena examples of which are apathy, listlessness, choreoathetosis, and convulsions. In addition, the adrenal gland has been shown to play an important role in the prevention and the combatting of shock.[47]

Tremendous advances have recently been made in the treatment of these disturbances. While it had previously been known that *adequate adrenal substance* could relieve the Addisonian or shocked patient the practical application of "adequate adrenal substance" was impossible.

In 1936 corticosterone and dehydrocorticosterone were isolated in crystaline form from adrenal cortical extracts. These substances appeared to maintain adrenalectomized animals in fairly good condition.[48,49] In 1937 the preparation of desoxycorticosterone acetate from stigmasterol was announced[50] and some what later this same substance was isolated from the cortex of the beef adrenal gland.[51]

Because of its ability to maintain electrolyte balance in adrenalectomized dogs[52] it was hoped that here at last was the missing factor synthetically produced in chemically pure form and in sufficient quantity to replace the defective adrenal gland in patients afflicted with Addison's disease and, perhaps, shock.

Clinical trials began and results were reported which at first were very promising.[53,56] It was soon observed, however, that while desoxycorticosterone acetate affected electrolytic balance it failed to influence the disturbed carbohydrate metabolism,[57,58] a defect which could be corrected by suitably prepared adrenal-cortical extracts.

It is now known that the adrenal cortex may yield a large number of crystalline steroids.[59] Of these only the unsaturated compounds with either an hydroxl group (corticosterone) or an oxygen atom (dehydrocorticosterone, compound F of Pfiffner and Wintersteiner) attached to the number 11 carbon atom favorably affect sugar metabolism—and this probably through their protein catabolic effects.[60] Corticosterone which is perhaps the most effective single agent in this respect has recently given great promise in its shock preventing effects. Perhaps in time this or other steroids used in combination with desoxycorticosterone acetate will completely restore to normal the hypochloremia, the hemoconcentration and the marked personality changes resulting from hypocorticaladrenalism.

Many advances have recently been made in the use of the sex hormones in neuropsychiatric conditions. The reactive depressions and feelings of inferiority resulting from the awareness of his defect by the hypogenital patient[61] are only too well known.

The production by an oversecretion of folliculin, of excessive eroticism, overaggression, excitement, hostility and frank psychoses have also been described. Some authors have considered these to result from cerebral vasodilatation which had been observed to follow the injection of folliculin.[62] Even homosexuality which hitherto had been explained on the basis of genetic (constitutional), psychogenic (experimental), or regressive (habit deteriorative elements, has now yielded evidence disclosing the possibility of humoral factors.[63,65]

The availability at present of numerous synthetically produced crystalline sex hormones has done much to test earlier hypotheses concerning the relationship of certain behavioral disturbances to gonadal insufficiency.

Because of its temporal relationship with the climacteric[66,67] involutional melancholia has long been suspected of arising as a result of gonodal failure. While no psychiatrist with proper perspective would fail to give adequate consideration to genetic dynamic factors,[68] the reports of improvement and even cures resulting from properly administered sex hormones must also be taken seriously. In 1923 Strecker and Keyes[69] using intramuscular injections of corpus luteum and ovarian substance already noted a beneficial influence in some of their cases. Since then a number of reports have appeared concerning the effect of sex hormones on the involutional psychic process in men[70,72] and women.[73,78] The details of these reports are obviously beyond the scope of this communication. But the available evidence seems to indicate that in males testosterone propionate is helpful while estrogenic substances are not. In the personal treatment of 37 male patients from 46 to 56 years with varying degrees of depression and loss of libido, 24 made a good recovery. In these patients testosterone propionate (Perandren) was subcutaneously injected in 10 mg. doses twice weekly. Of course, in such patients sufficient sexual rest must be advised, the patient must be encouraged, and the resolution of psychic conflicts must be carried out wherever possible. Those patients who recovered showed definite improvement within two months.

Another use of testosterone propionate has recently been described by Hesser, Langworthy and Vest[79] who through its use improved the muscle strength in a hypogonadal patient suffering from myotonia atrophica.

In females estrogenic therapy has been distinctly beneficial in certain cases. While some reports are discouraging[73,74] others are quite encouraging.[75,77] Some claim that beneficial response is best noted in patients displaying signs of hypoovarianism either alone or associated with hyperthyroidism.[75] Others feel that the menopause must be natural rather than to have been produced artificially by surgery or radiation.[78]

Perhaps the most important criteria for possible recovery are the duration of the illness and the personality type of the patient.[76,77] It is now well recognized that the woman developing involutional melancholia is generally the inhibited, serious, overconscientious, and overmeticulous person who is frequently desirous of attaining goals which remain forever beyond her grasp. It must be admitted, however, that one cannot predict which patient will and which patient will not respond favorably to estrogenic therapy. In a series of 34 extramural patients who were naturally relatively mild in their symptoms but who were none the less sufficiently disturbed by hot flashes, depressed feelings, crying spells, and insomnia to seek medical aid, 20 recovered. Although all patients were studied carefully in an attempt to evaluate personality, psychogenic, and endocrine factors no strict clinical correlation could be noted. All that can be said is that these patients who had failed to respond to all previous therapies which included dietary and hygienic regulation, suggestion and discussion of possible personality difficulties were given subcutaneous injections three times weekly of 5 mg. estradiol dispropionate (diovocylin). This was repeated for three weeks and was followed during the 4th week by 2 injections of 5 mg. progesterone (lutocylin). Thereafter diovocylin was decreased to 2 injections (of 5 mg.) weekly for three weeks and was followed by 2 injections of lutocylin (2 mg.) during the 4th week. This routine

was maintained for the duration of treatment. It was felt that this alternating use of the two hormones more nearly imitated the follicular and luteal stages of normal ovarian function.

The decreased dosage was employed after the first month because it had been found that prolonged administration of large doses of sex hormones resulted in pituitary depression,[80,82] a circumstance which led to the successful use of large doses of testosterone propionate in the treatment of morbid sex craving.[83]

The dosage of hormone and its expression in terms of crystalline weight rather than in terms of biological units is extremely important wherever possible in endocrine therapy. This is particularly true since most of the work which is still in its infancy will undoubtedly be repeated over and over again. In earlier days when one had to use variously prepared extracts, or "soups" as Dr. Carl Hartman once expressed it, the "mouse" or "rat" or "rabbit" or "capon" unit was in order. The "mouse" or "rat" unit for estrogenic substances was then considered to be the amount of extract just able to produce an estrogenic smear in the respective animal. However, it soon became apparent that no two laboratories determined their "units" under the exact same conditions. The situation became so confusing that the Committee for Hormones of the Health Organization of the League of Nations created what was called the "International Unit." Thus the I. U. for estrone was represented by 0.1 gamma of the crystalline substance. One mg. of estrone therefore contains 10,000 I. U. This is in no way comparable to "rat" units since, as previously mentioned, the biological unit is based on biological reactions which necessarily differ not only with the strain of the animal but vary from day to day, even as the weather.

When the newly synthesized estrogen estradiol benzoate became available it soon became apparent that even this crystalline substance "could not be assayed in relation to the hydroxyketonic standard" (estrone). A new I. U. represented by 0.1 gamma estradiol benzoate was therefore established by the Committee of the League of Nations and this was called the "benzoate unit." This unit was not to be translated in terms of the "estrone unit." Since the adoption of individual units for each newly synthesized hormone ester would result only in confusion, an international unit for the more recently synthesized estradiol dispropionate was never established. The dosage as expressed by weight which remains constant can, however, always be duplicated. Hence its advantage in studies such as these.

The relationship of the pancreas to neuropsychiatric conditions need only be mentioned in passing. The dependence of normal brain functions upon adequate oxidation of blood-carbohydrate[84,85] and the alteration of these relations in the insulin-treatment of psychotics[86,90] are well known. Another way in which insulin therapy can serve neuropsychiatry is perhaps illustrated in a less dramatic manner.

A white male, H. S., who was recently referred by an orthopedist because of pain in the left hip which radiated down to his left knee for 3 months was found to have pin and needle sensations of the entire left lower extremity and paresthesias objectively over a distribution corresponding to LIII-SIII. Muscle atrophy and motor weakness were absent but his left knee jerk was unobtainable and electrical studies showed the absence of reaction to degeneration. It was felt that this patient was suffering from a posterior radiculitis. Urinalysis and blood studies disclosed advanced diabetes mellitus. Dietary and insulin therapy during these past three weeks have resulted in continuous improvement. The previously abolished knee jerk is beginning to reappear.

The contributions of the pineal gland toward therapy in neuropsychiatric cases has been practically nil unless one includes the possible correction of the misjudgment of the pinealoma-occasioned "pubertas praecox" child by removal of the tumor. In the same category could be placed the correction of myasthenia gravis by surgical extirpation[91,92] or radiation[93] of the thymus.

Last to be considered as a source of endocrine aid to the neuropsychiatrist is the liver. The hematopoietic function of this organ and the neurologic and psychiatric sequelae of untreated pernicious anemia are now clearly recognized.[93,94] Both such complications have been personally observed in a number of patients. The mental changes which consisted of loss of interest in previous activities, alter-

ability of mood, grandiose but vague ideas of future accomplishments and defects in sensorium which are characteristic of organic brain defects, responded well to liver therapy. The neurological findings, however, especially when advanced were more refractory to treatment—perhaps because of the non-reparative gliosis which occurs in long standing cases.

Thus, without detailed reiteration it may be said that all glands of internal secretion affect behavior. It follows that many behavioral disturbances may result from endocrine dysfunctions. It is true that some of the recognizable endocrine concomitants of neuropsychiatric patients may be associative rather than causal in nature. In other instances it has been shown that the encountered endocrinopathy undoubtedly precedes the neurologic or psychiatric disorder. In either case the judicious use of endocrine preparations may serve as valuable therapeutic adjuncts.

As a result of the development of endocrinology the earlier recognized anatomically-determined relationships between the neuronal and hormonal systems have now become broadened to include newly recognized functional concepts. These have not only helped in the general progress of medicine but, because of their far-reaching personality effects, have favored neuropsychiatry in particular.

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Non-Specific Measures in the Treatment of Neurosyphilis

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No method of treating syphilis in any of its manifestations can be as effective as the effort to inform the public which is being directed by the United States Public Health Service. Teaching the public something of the nature of this disease and the description of methods of prevention and treatment has reduced the incidence perceptibly. No longer can there be any doubt that syphilis may eventually be made a rare disease. Neurosyphilis is seen less frequently now than it was a decade ago, but until the spread of the disease has entirely ceased, the physician, and especially the neurologist, should continue to manifest an energetic interest in its treatment.

There has lately been a renewal of interest in fever therapy, with the unfortunate result that many equally effective forms of non-specific treatment have been neglected. We believe that chemotherapy, fever therapy, and other non-specific measures of treatment can be combined to produce more satisfactory results.

It has long been recognized that fever therapy has been beneficial, and there is little doubt that the favor enjoyed by the hot baths of the ancients and the more recent popularity of Hot Springs, Arkansas, depended largey upon the benefit derived from the fever and acceleration of circulation produced. Hence a revival of and improvement of this method of treatment was inevitable. With elevation of temperature, no matter how produced, there is acceleration of circuiation, a hemo-concentration and stimulation of forces of bodily resistance. It is our belief that

malaria and temperature elevations produced by vaccine injections are considerably more effective than artificial fever because they stimulate the powers of bodily resistance more thoroughly.

Each form of fever therapy has certain advantages and disadvantages, as enumerated below, and a balancing of these factors will determine which means of fever production should be utilized under varying circumstances. At all times it must be borne in mind that any form of fever treatment is a dangerous procedure, and although space does not permit a consideration of all the contraindications and cautions, one should not contemplate fever therapy in any patient whose basic physical condition is such that the accidental development of an acute infection would be considered a matter of grave concern. In our experience convulsive and acutely agitated patients do not do well on malaria, and in such cases we prefer typhoid vaccine. Negroes and Italians, especially natives of southern Italy, are not easily inoculated with malaria and in those patients artificial fever is indicated.

In the commoner means of artificial fever production such as warm baths, diathemy and heat cabinets such as the Kettering hypertherm, it must be remembered that the basic principle is the prevention of loss of heat by radiation and therefore the temperature elevation is exactly the same as thermic fever of any hot, humid clime. In 1932 Hadden and Wilson[1] pointed out that wrapping patients in woolen and rubber blankets would prevent heat loss and secure any desired degree of fever production. With experience this mode of paralyzing loss of heat by radiation may be as effective as the Kettering hypertherm, and generous supplies of woolen blankets and rubber sheets are available in all hospitals. Warm baths may likewise be utilized to produce elevations of temperature that are just as effective as those produced by any elaborate equipment.

Regardless of what method is utilized to produce fever, it must be realized that it is dangerous, and caution and care are necessary. In every method of fever production replacement of chlorides during and after treatment is important, and a high protein and albumin diet is also necessary.

As in any disease, accurate diagnosis and careful estimation of all factors are to be desired before a program of treatment is determined. It must be remembered that a positive blood or spinal fluid Wassermann plus mental symptoms does not indicate that the latter are the result of an active luetic involvement of the brain. The patient may be a "Wassermann-fast" individual in whom a failing circulation from luetic myocardial disease, anemia, heavy metal poisoning, other intercurrent disease or drug intoxication may be responsible for the mental symptoms, and the effective treatment is the treatment of the circulatory or other disorder and not a series of "injections" or fever therapy. We must forever remember that syphilis does not confer an immunity to all other diseases, and that an abscessed tooth may still cause joint pain in a tabetic, and the disorders enumerated still produce mental symptoms.

In considering the undramatic but effective non-specific measures, *rest* must be given a place of great importance. Complete mental and physical rest should be obtained by sanitarium care where possible. In patients so treated the greatest benefit may be anticipated. In restless patients greater reliance should be placed upon *hydrotherapy* by means of baths and packs than upon drugs. The paretic seems particularly susceptible to barbiturates, therefore where sleep is essential—hydrotherapy failing—paraldehyde should be preferred to drugs of the barbiturate group.

It is axiomatic that no organ can function without an adequate amount of nutriments, hence particular attention must be directed toward the correction and prevention of anemia and the maintenance of a proper nutrient medium through the avoidance of alcohol and other toxic agents or drugs. *Adequate food supply* with vitamin reinforcement is most desirable, and in the absence of appetite, tonics and insulin may be essential to induce this. Attention should always be given to the state of the gastro-intestinal tract for its aid in the digestion and assimilation of foods. A simple hypochlorhydria in a patient with syphilis can be more successfully treated by hydrochloric acid with meals than by Salvarsan intravenously.

In recent years the *skin* has come to be regarded as an organ rather than inert casing, and it appears to play an important role in the production of immunity. It is of in-

COMPARISON CHART

Form of Therapy	*Advantages*	*Disadvantages*
MALARIA	1. A naturally induced fever for which there is an almost unfailing specific. 2. Requires no special equipment. 3. No more than routine nursing care is necessary. 4. Duration of treatment cannot be altered by patient's lack of cooperation. 5. Low cost. 6. Unlimited number of patients may be treated at one time, consequently, more desirable in large hospitals.	1. Not available in all localities, but blood can be "shipped" from a supply center all over the country. 2. Difficulty maintaining an even strain, without mixed infections. 3. Apparent immunity of Negroes and patients reared in southern Italy against benign tertiary. 4. Occasional spontaneous termination before therapeutic effect has been obtained. 5. Occasional liver and other undesirable organic complications. 6. Occasional malignant infestation. 7. May sometimes recur.
TYPHOID or Other Intravenous Vaccines	1. Is available any place. 2. Has effects similar to actual bacterial invasion. 3. Can be used in patients immune to malaria. 4. On days when patients are not treated they may be ambulatory and actually employed. 5. May be used in conjunction with prevention of radiation, to prolong duration of temperature elevation. 6. Any number of patients may be treated.	1. Uncooperative patients may terminate treatment by unwillingness to continue. 2. Even with split doses the amount of vaccine required rapidly increases.
HYPERTHERM and other forms depending upon prevention of radiation of body heat	1. Like vaccine, may be used in unhospitalized patients. 2. Theoretically, the degree of temperature can be more satisfactorily controlled. 3. Is not infecting with a disease.	1. Requires costly apparatus; one patient per machine per day is usual number that can be treated. 2. Nurse and trained medical supervision are constantly advisable. 3. Continuation of treatment depends upon patient's will. 4. Uncooperative patients cannot be treated with safety. 5. Because of inability to treat a considerable number of patients in large hospitals, the cost is prohibitive where only one machine is available.

terest to recall that methods of stimulating the skin have been popular and effective since the beginning of medicine. Massage, salt rubs, Scotch douches, exposure to fresh air and sunshine, and ultraviolet light are all modes of stimulating the skin and should be a part of non-specific therapy. It has been our feeling for years that the principal benefit derived from mercury rubs is the result of the irritation of the skin as much as from any specific effect of the mercury. Measures to stimulate the skin should be a part of any "routine treatment" of neurosyphilis.

As a means of increasing cerebral circulation, and thus promoting healing, with McGlone and Martucci[2] the effects of *transcerebral diathermy* were studied and found to be of great benefit in treating paretics. This method is easily applied, has produced no untoward results, and is effective. One of the especially desirable benefits of transcerebral diathermy is the improvement of the quality of sleep in all types of cases where insomnia has been a factor. In cases of paresis with a depressed reaction *electric shock* may have a favorable effect, and may be far more beneficial than malaria or other forms of fever therapy.

In a consideration of non-specific measures *psychotherapy* must be given special attention. In dealing with any patient having neurosyphilis one must constantly encourage and reassure. Efforts to obtain cooperation through stimulation of confidence and hope will be amply repaid.

In conclusion may we emphasize the fact that measures to improve general bodily health and accelerate circulation should not be regarded as substitutes for specific antiluetic treatment but as important and effective supplements. A plea is made that all patients be treated with intelligence rather than by rigid programs of pills, injections and potions.

37 South 20th Street.

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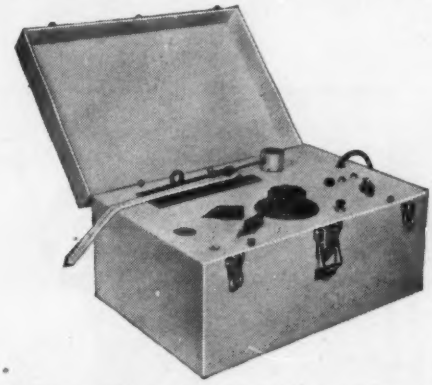

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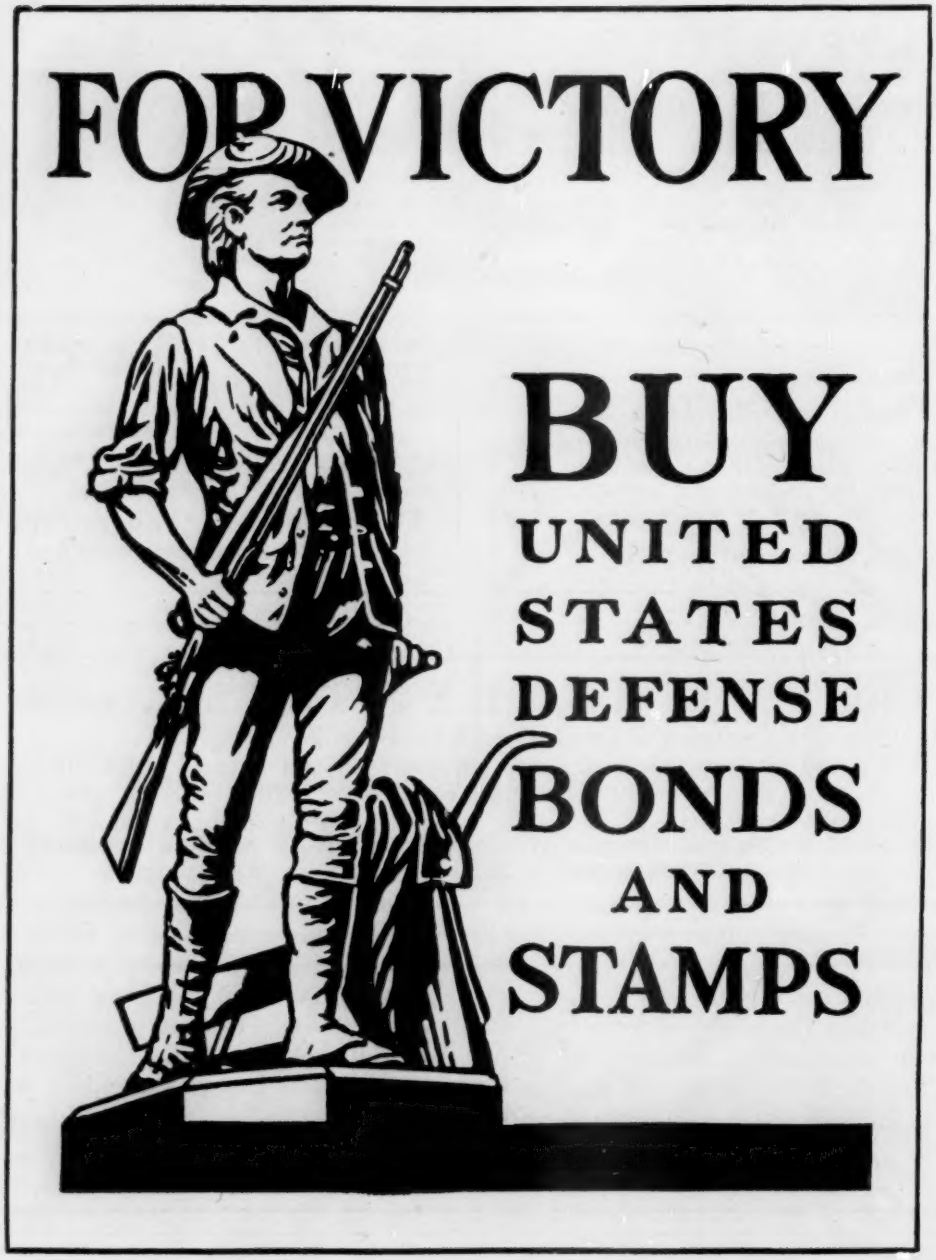
Homelike surroundings in small individual cottages distributed over twenty-four acres of wooded park with ample recreational facilities.

WILL REBEC, M. D., *Medical Director*

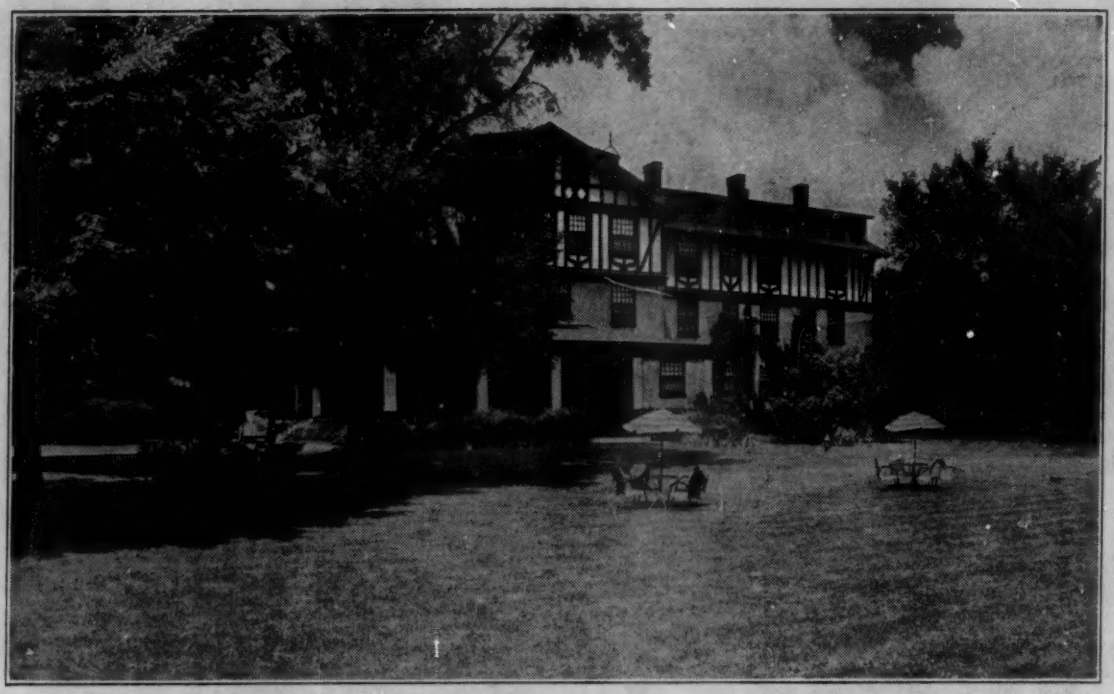

FOR VICTORY
BUY
UNITED
STATES
DEFENSE
BONDS
AND
STAMPS

SANITARIA DIRECTORY

The institutions listed in this section are among the finest private sanitaria in the United States.

They are prepared to offer private, individual, specialized care to your patients.

Information Regarding This Space Will Be Sent on Request	**PASADENA SANITARIUM** South Pasadena, California
BEVERLY HILLS SANITARIUM Dallas, Texas	**RING SANATORIUM AND HOSPITAL, Inc.** Arlington, Massachusetts
CHESTNUT LODGE SANITARIUM Rockville, Maryland	**ROGERS MEMORIAL SANATORIUM** Oconomowoc, Wisconsin
COMPTON SANITARIUM and LAS CAMPANAS HOSPITAL Compton, California	**SAINT ALBANS SANATORIUM** Radford, Virginia
FENWICK SANITARIUM Covington, Louisiana	**ST. JOSEPH SANITARIUM** Dubuque, Iowa
THE FOREST SANITARIUM Des Plaines, Illinois	**THE RETREAT** Des Moines, Iowa
GLENSIDE Boston, Massachusetts	**THE STOKES SANITARIUM** Louisville, Kentucky
HARDING SANITARIUM Worthington, Ohio	**TUCKER HOSPITAL** Richmond, Virginia
HIGHLAND HOSPITAL, INC. Asheville, North Carolina	**TWIN PINES** Belmont, California
KENILWORTH SANITARIUM Kenilworth, Illinois	**WINDSOR HOSPITAL** Chagrin Falls, Ohio
LIVERMORE SANITARIUM Livermore, California	**WADSWORTH SANITARIUM** South Norwalk, Connecticut



Today It Is Treatment

Since the introduction of modern treatments for mental illnesses, sanitaria no longer properly belong in the class of custodial institutions. They should be, instead, centers of active medical treatment.

In keeping abreast with the progress in the psychiatric field, the KENILWORTH SANITARIUM has been among the first to adopt each of the modern methods of treatment for all types of nervous and mental illnesses.

So that today, the attending physician is offered here, facilities for use of the various modern treatments, accepted to date, with the full assurance of cooperation from an adequately experienced personnel.

ADDRESS OR PHONE, DIRECTOR,

Kenilworth Sanitarium

KENILWORTH, ILLINOIS
Telephone Wilmette 351 and 1662

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